What is claimed is:

1. A separator for high power lithium batteries, based on a sheetlike flexible substrate having a multiplicity of openings and having a porous inorganic electrically insulating coating on and in said substrate, said coating closing the openings in the substrate, the material of said substrate being selected from non-woven electrically nonconductive polymeric fibers and said inorganic electrically insulating coating comprising particles, wherein the separator is an electrical insulator and has lithium ion conducting properties without the presence of an electrolyte and wherein the separator comprises at least one inorganic material which may also contain organic groups and which has lithium ion conducting properties and which is chemically bonded to the inorganic coating.

2. The separator of claim 1, wherein the particles of the inorganic electrically insulating coating comprise particles of oxides of the elements Al, Zr and/or Si.

3. The separator of either of claims 1 and 2, wherein at least one inorganic material which may also contain organic groups and which has lithium ion conducting properties is present as an admixture in the structure of the separator.

4. The separator of at least one of claims 1 to 3, wherein at least part of the material forming the inorganic porous coating has lithium ion conducting properties.

5. The separator of at least one of claims 1 to 4, comprising as inorganic lithium ion conducting materials at least one compound from the group of the lithium phosphate zirconate glasses, α- and/or γ-lithium zirconium phosphates or lithium sulfonates or lithium phosphonates which are attached to α- and/or γ-zirconium phosphonates, or a mixture of these compounds.

6. The separator of at least one of claims 1 to 5, wherein the inner and/or outer surfaces of the oxide particles present in the separator are coated with a layer of a lithium ion conducting inorganic material which may also contain organic groups.

7. The separator of claim 6, wherein the layer has a thickness of from 10 to 100 nm.

8. The separator of at least one of claims 1 to 7, which comprises a lithium ion conducting material comprising negative-charge-carrying matrix constituents and lithium cations.

9. The separator of at least one of claims 1 to 8, wherein the lithium ion conducting material contains ionic groups selected from the group consisting of sulfonates, phosphonates, carbonates, sulfonylamides and mixtures of these groups.

10. The separator of claim 9, wherein the ionic groups are bonded chemically to the inorganic particles via organic groups or spacers.

11. The separator of claim 10, wherein the ionic groups are attached directly or indirectly via the organic groups or spacers, via Si-O- or Zr-O- groups to the inorganic particles.

12. The separator of claim 11, wherein said organic groups or spacers are fluorinated or nonfluorinated aryl and/or alkyl chains and/or polyether chains and the ionic groups are thereby connected to the inner and/or outer surface of the particles present in the separator.

13. The separator of at least one of claims 1 to 12, wherein the ion conducting separator is bendable down to a smallest radius of 0.5 mm.

14. A process for producing a separator having lithium ion conducting properties as claimed in any of claims 1 to 13, comprising a sheetlike flexible substrate having a multiplicity of openings and having a porous inorganic electrically insulating coating on and in said substrate, the material of said substrate being selected from non-woven electrically non-conductive polymeric fibers, which comprises a sheetlike flexible substrate having a multiplicity of openings being provided with a coating on and in said substrate the material of said substrate being selected from non-woven electrically nonconductive polymeric

fibres and said coating being a porous electroinsulating ceramic coating and using a compound having lithium ion conducting properties to produce the separator.

15. The process of claim 14, wherein the separator having lithium ion conducting properties is obtained by treating a separator which does not have lithium ion conducting properties with at least one ion conducting material or with at least one material which following a further treatment has ion conducting properties.

16. The process of claim 14 or 15, characterized in that for the treatment with a lithium ion conducting material the material used to produce the lithium ion conducting separator is a material which carries negative fixed charges and lithium cations as counterion, the material carrying negative fixed charges being selected from compounds which attach to the surface of the inorganic coating via a phosphonyl or siloxane group.

17. The process of at least one of claims 14 to 16, wherein the treatment of the separator with at least one lithium ion conducting material or at least one material which following a further treatment has lithium ion conducting properties takes place by impregnating, dipping, spreadcoating, rollercoating, knife coating, spraying or other coating techniques.

18. The process of at least one of claims 14 to 17, wherein the separator following treatment with at least one lithium ion conducting material or with at least one material which following a further treatment has lithium ion conducting properties is thermally treated.

19. The process of claim 18, wherein the thermal treatment is conducted at a temperature of from 50 to 280°C.

20. The process of at least one of claims 14 to 20, wherein the material used to produce the inorganic porous coating is a material which has lithium ion conducting properties.

21. The process of claim 20, wherein the material used to produce the inorganic porous coating is a material selected from lithium phosphate zirconate glasses, α- and/or γ-lithium

zirconium phosphates, and zirconium phosphates doped with lithium sulfonates or doped with immobilized lithium sulfonates.

22. The use of a separator as claimed in at least one of claims 1 to 13 as a separator in lithium batteries.

23. The use as claimed in claim 22, wherein the separator for use in lithium batteries is impregnated with an electrolyte.

24. The use as claimed in claim 23, wherein a solution of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiAsF_6$, $LiCF_3SO_3$, $LiClO_4$, lithium bisoxalatoborate (Libob) and/or lithium bis(trifluorormethylsulfonyl)amide (BTA, $LiN(SO_2CF_3)_2$) in ethylene carbonate (EC), dimethyl carbonate (DC), propylene carbonate (PC), methyl propyl carbonate (PMC), butylene carbonate (BC), diethyl carbonate (DEC), γ-butyrolactone (γ-BL), $SOCl_2$ and/or SO_2 is used as electrolyte.

25. A battery which comprises a separator as claimed in at least one of claims 1 to 13.